

RUSTRAK CATALOG PRICE LIST

Page 2 MODEL 88

0-50 UA	\$98.50	0-1 Amp	\$84.00
0-100 UA	91.50	0-3 Amp	86.00
0-200 UA	89.50	0-5 Amp	86.00
0-500 UA	97.50	0-10 MV	94.50
0-1 MA	79.50	0-25 MV	94.50
0-1.5 MA	84.00	0-100 MV	81.00
0-3 MA	84.00	0-1 V	84.00
0-5 MA	84.00	0-3 V	84.00
0-10 MA	84.00	0-5 V	84.00
0-15 MA	84.00	0-10 V	84.00
0-30 MA	84.00	0-15 V	84.00
0-50 MA	84.00	0-30 V	84.00
0-75 MA	84.00	0-50 V	84.00
0-100 MA	84.00	0-75 V	84.00
0-150 MA	84.00	0-100 V	84.00
0-300 MA	84.00	0-150 V	85.00
0-500 MA	84.00	0-300 V	87.00
0-750 MA	84.00	0-500 V	88.00

MODEL 88-117 A (without shunt) 82.50
External 100 MV Shunts:

0/10 Amps	12.50	0/200 Amps	\$ 12.50
0/20 Amps	12.50	0/300 Amps	12.50
0/40 Amps	12.50	0/400 Amps	14.60
0/50 Amps	12.50	0/500 Amps	18.50
0/75 Amps	12.50	0/600 Amps	18.90
0/100 Amps	12.50	0/800 Amps	25.20
0/150 Amps	12.50	0/1000 Amps	31.50

MODEL 91 \$124.50 0-1 MA DC both channels
144.50 0-100 UA DC both channels
139.50 0-1 MA DC; 0-100 UA DC

Page 3 MODEL 111A MODEL 111B MODEL 88R

\$ 44.50	
44.50	
92.95	0-50 V
89.95	0-150 V
91.95	0-300 V
104.95	0-600 V

MODEL 93	94.95	
MODEL 93A	98.95	
MODEL 93B	104.95	
MODEL 118	105.00	
MODEL 107	132.50	
2 switched ranges	10.00	Extra
3 switched ranges	15.00	Extra
Extra clamp-on probe	32.50	

Page 4 MODEL 113A	\$ 195.00	
Range divider	5.00	Extra
MODEL 120	149.50	
MODEL 120A	154.50	
MODEL 120B	159.50	
MODEL 110	89.50	120 V, 50/60 CPS
	94.50	240 V, 50/60 CPS
MODEL 98	109.50	120 V, 50/60 CPS
	114.50	240 V, 50/60 CPS

Page 5 MODEL 114	\$ 110.00	120 V
	115.00	240 V
MODEL 114A	160.00	
MODEL 92	88.00	

Page 6 MODEL 921	\$ 10.50	
MODEL 921A	15.00	
MODEL 920 or 922	79.50	
Transducers	price on request	
Elapsed time and totalizer	price on request	
MODEL 133	170.00	

Page 7 MODEL 133A	\$180.00	
MODEL 133B	270.00	
MODEL 133C	280.00	
MODEL 1331	13.50	
MODEL 1332	21.00	
MODEL 1333	25.50	
MODEL 1334	21.00	

Page 8 MODEL 144	\$180.00	
MODEL 144A	200.00	

Page 9 MODEL 1441	39.50	
MODEL 1442	10.50	
MODEL 1443	3.00	

Page 10 MODEL 147	240.00	
MODEL 141	75.00	105 to 125 V
	80.00	210 to 250 V
(When ordering a Rustrak recorder with Controller, add the number 141-A, B, C or D depending upon type of control wanted. Add price to recorder.)		

Page 11 MODEL 146	\$ 105.00	1 MA Galvo
	118.00	100 UA Galvo

Page 12 MODEL 109		
MODEL 109A	30.00	
MODEL 109B	30.00	
MODEL 137	30.00	

Page 13 CHART PAPER	13.50	6 roll package
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Page 15 DRIVE MOTORS

AC Motor Type 120 Volt/60 Cycle

1/2 rpm	\$ 7.50
1 rpm	7.50
2 rpm (standard)	
4 rpm	5.00
6, 8, 10, 12, 15 rpm	15.00
60 rpm (Event only)	15.00

120 Volt or 240 Volt/50 Cycle

1 rpm	\$ 12.50
2 rpm	5.00
6, 8, 10, 12, 15 rpm	20.00
60 rpm (Event only)	20.00

Unregulated DC Motors

6, 12, 24-28 Volt	46.00
48 Volt	50.00

Regulated DC Motors

6, 12, 24 Volt	150.00
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400 Cycle Motors	56.00
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OPTIONS

Access Window	\$ 5.00
Tear-Off Feature	15.00
Installation of Gear Trains other than basic 1"/Hr.	
Extra Gear Trains	5.00
Special Scale not requiring artwork	3.00
Special Scale requiring artwork	50.00 (One time charge)
1% accuracy, single channel DC only	10.00
Command Print available in DC	5.00
RETMA panel (two, three, four hole)	15.00



A SUBSIDIARY OF GILFULTON INDUSTRIES, INC.

130 SILVER STREET, MANCHESTER, NEW HAMPSHIRE

Effective Date 4/5/63

Printed in U.S.A.

rusttrak[®]

A SUBSIDIARY OF **Gi** GULTON INDUSTRIES, INC.

miniature recorders

for economical
and accurate measurement



Rustrak

galvanometer chart recorders

The Rustrak analog chart recorder was specifically designed to meet modern needs to produce accurate, dependable written information. In spite of its low cost, the recorder is a precision instrument housed in a rugged die cast aluminum case. The motor drive mechanism, galvanometer, and writing system will give many years of faithful service under extremely rough usage.

When recording, a smooth high resolution line is made on the chart paper without requirement for ink, heated stylus, or voltage sensitive paper. Because the Rustrak recorder uses pressure sensitive paper, the recorder can be used from sub zero temperatures to 160°F; from sea level to altitudes of 100 thousand feet and under high humidity conditions. All that is needed to weatherproof a Rustrak recorder is to drape a polyethylene film bag over it. It is a common sight to see Rustrak recorders mounted on the cross arms of telegraph poles in all parts of the world gathering dependable data day and night, winter and summer.

The recorder chart drive is powered by AC synchronous motors, any standard voltage or frequency, or DC motors which consume only milliwatts of power. Other models are available with self-contained rechargeable batteries so that they may be operated for considerable periods of time on an overnight



charge. The rechargeable batteries are guaranteed for five years.

The Rustrak recorder can be used to replace almost any indicating meter where it is preferable to automatically log information, thereby eliminating the need for continuous surveillance. The Rustrak recorder is capable of gathering voluminous data at very slow chart speeds, thereby assuring economical operation. Chart speeds are available from 1/16" per hour to 450" per hour on all analog (galvanometer) recorders and from 1/4" per hour to 1800" per hour on event recorders. Information with a duration of 20 milliseconds is clearly visible on the chart.

With interchangeable gear trains and drive motors, 99 different chart speed combinations are available. With any one drive motor 11 different chart speeds are available through a very fast interchange of standard gear trains. (At 1" per hour, a standard paper roll lasts a full month.) Recorders are available in either reroll or tear-off type. In the reroll type, the paper rewinds inside the recorder. In the tear-off type, the paper feeds out of the recorder and may be torn off when desired. (This feature can be used instead of circular chart recorders.)

Rustrak Recorders can be ordered as portable units or for panel mount.

single
channel
d.c.
recorders

rustrak

model 88



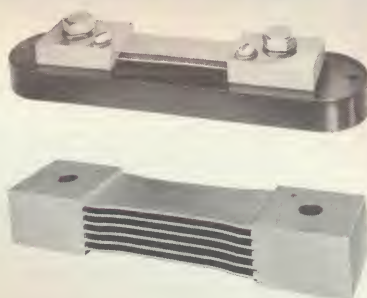
Range		
0-50 μ a	0-75 MA	0-1 V
0-100 μ a	0-100 MA	0-3 V
0-200 μ a	0-150 MA	0-5 V
0-500 μ a	0-300 MA	0-10 V
0-1 MA	0-500 MA	0-15 V
0-1.5 MA	0-750 MA	0-30 V
0-3 MA	0-1 Amp	0-50 V
0-5 MA	0-3 Amp	0-75 V
0-10 MA	0-5 Amp	0-100 V
0-15 MA	0-10 MV	0-150 V
0-30 MA	0-25 MV	0-300 V
0-50 MA	0-100 MV	0-500 V

All of above ranges use zero left galvanometers. Other ranges as well as zero center, offset or suppressed galvanometers are available on order.

model 88-117a high current d.c. recorders

Basic recorder with 0-100 MV galvanometer, scale calibrated to range required.

model 117a shunts external 100 mv d.c.



Shunt	Shunt	Shunt
0/10 amps	0/100 amps	0/500 amps
0/20 amps	0/150 amps	0/600 amps
0/40 amps	0/200 amps	0/800 amps
0/50 amps	0/300 amps	0/1000 amps
0/75 amps	0/400 amps	

dual
channel
d.c.
recorders

model 91



Range
0-1 MA DC both channels
0-100 μ a DC both channels
0-1 MA DC and 0-100 μ a DC

All of the above ranges use zero left galvanometers. Ranges with zero center, offset, or suppressed galvanometers are available on order. Most standard D.C., voltage and current combinations are available with dual channel D.C. recorders. Write for information.

multi-rangers

model 111a



Model 111 A Multiplier Box . . . consists of multipliers and parallel shunts with a selector switch so that a standard Rustrak 1 MA recorder will produce the following readings when used in conjunction with this box: 1-5-10-50-100-500-1000 volts or milliamperes DC. This unit is identical in size to the Rustrak recorder and is available either portable or panel mounted.

model 111b

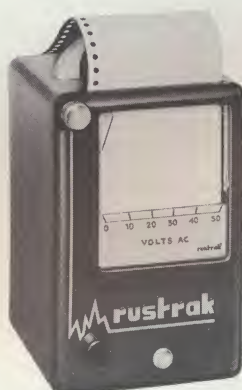
Model 111 B Multiplier Box . . . same as Model 111A, but has the following selectable characteristics: 3-15-30-75-150-300-750 volts or milliamps DC. The 111 B is designed for use with Rustrak Style "B" chart paper.

single channel a.c. recorders

a.c. voltage

model 88r model 93

high resolution a.c. recorders



Range

0-50V AC
0-150V AC
0-300V AC
0-600V AC



Range

Model 93
70-135V AC
Model 93A
70-135V AC
140-270V AC
Model 93B
70-135V AC
140-270V AC
280-540V AC

other ranges
on order.

a.c. current

model 118 model 107



Range

0-1 amps AC
0-5 amps AC



Model 107, w/clamp-on transducer, any single range. 0-10, 20, 30, 50, 100, 200 amps AC

or
0-300, 400, 500, 600, 800 amps AC

Multiple ranges of above available to a maximum of three ranges.

model 113a a.c. power tester and recorder

Utilizing our Model 137 (page 12) Time Sharing Feature, the Model 113A is available with 1 Rpm motor only, and writing speed of 1 strike per channel each 8 seconds.



Voltage Ranges: 0-150 V, 0-300 V, 0-600 V
Ampere Ranges: 0-15 A, 0-30 A, 0-60 A, 0-150 A
Accuracy: $\pm 3\%$
This versatile instrument is capable of recording both voltage and current at the same time.

dual channel a.c. recorders

model 120 dual channel a.c. power recorder



Model 120, 0-5 Amps AC: 100-140V AC
Model 120A, 0-5 Amps AC: 100-140V AC
200-280V AC
Model 120B, 0-5 Amps AC: 100-140V AC
200-280V AC
400-560V AC

amplifiers

Rustrak offers a comprehensive line of DC Amplifiers for use with Rustrak recorders. However, Rustrak Amplifiers can be used with other makes of recorders or galvanometers to produce dependable information. All Rustrak Amplifiers are chopper stabilized vacuum tube types. Thousands of amplifiers in the field have proven the Rustrak Amplifier series to be dependable and accurate. All Rustrak Amplifiers have a 5 thousand ohm, 5 volt maximum output. The output, therefore, can be shunted by almost any galvanometer. The drift and linearity of Rustrak Amplifiers is of such small magnitude that they do not depreciate the accuracy of the galvanometer or recorder the amplifier is used with. The overall dimensions of Rustrak Amplifiers are the same as

model 110

Absolute accuracy 1% due to all causes
Input resistance 10 megohms, all ranges
Frequency response .. D.C. to 5 cycles
Ranges 1.0, 10.0, 100, 1,000 volts D.C.



model 98

Absolute accuracy 1% due to all causes
Input resistance 1 megohm, all ranges
Frequency response .. D.C. to 5 cycles
Ranges01, .05, .1, 1.0, 10.0 volts D.C.
1.0, 10 micro-amps



Rustrak Records except they are 3" deeper, thereby allowing building block systems to be assembled with ease. All Rustrak Amplifiers are equipped with interconnecting cables so that their use with Rustrak Records require no effort other than plugging in.

General sensitivity ratings for Rustrak Amplifiers are for a one milliamperere recorder or galvanometer, however, using more sensitive instruments increases the sensitivity of the system. Using a 200 microampere galvanometer increases the sensitivity 5 times.

Using a 100 microampere galvanometer increases the sensitivity 10 times. For example, the Model 98 Amplifier has a maximum full scale sensitivity of 10 millivolts with a one milliamperere galvanometer. If a 100 microampere galvanometer is used, the sensitivity becomes one millivolt. Because of the low noise and drift factors in the amplifiers, the above is entirely feasible. All Rustrak DC Amplifiers are bipolar and can therefore be used with zero center recorders or galvanometers.

Standard Rustrak Amplifiers operate from 105 to 130 volts, 50-60 cycles. Power consumption 15 watts. Operation from 210 to 260 volt 50-60 cycle is available from stock on order.

event (operations) recorders and accessories

rustrak

model 114

The Model 114 Amplifier can be used with low or high resistance transducers having low D.C. MV outputs.



Absolute accuracy 1% due to all causes
Input resistance 100,000 ohms
Frequency response .. D.C. to 5 cycles
Sensitivity 9 MV continuously variable
Zero Offset 1/2 scale, 1 MA (not affected by gain setting)

model 114a

The Model 114A Amplifier is identical in characteristics to the Model 114 except that it is designed specifically to be used with thermocouples. An exclusive feature of the Model 114A is automatic cold junction compensation achieved by the temperature compensated terminals on the amplifier. When ordering the 114A, specify the thermocouple material. Cold junction compensation on the above is 0° to 50°C, or 32° to 122°F. Compensation for other ambients available.

model 92

four channel event recorder



CHART SPEED Standards speeds: 1/4, 1/2, 1, 2, 3, 6, 10, 12, 15, 30 and 60 inches per hour with interchangeable gear trains (specify with order); 1/16" to 1800" per hour available on order.

PEN ACTUATORS Standard 24 volts DC at 100 MA nominal; 48 volts DC at 50 MA nominal available at no extra cost; other voltages on order.

RESPONSE TIME Twenty pulses per second or 50 milliseconds nominal.

RECORD PATTERN Continuous writing, rectangular. Completely dry, heatless writing process.

Model 92 EVENTS RECORDER CHART SPEED DATA. (For other available speeds refer to page 14)

Gear Box Number		# 1/4	# 1/2	# 1	# 2	# 3	# 6	# 10	# 12	# 15	# 30	# 60
2 RPM	Chart Speed in./hr.	1/4	1/2	1	2	3	6	10	12	15	30	60
Motor	Min. Event Time Sec.	720	360	180	90	60	30	18	15	12	6	3
8 RPM	Chart Speed in./hr.	1	2	4	8	12	24	40	48	60	120	240
Motor	Min. Event Time Sec.	180	90	45	22.5	15	7.5	4.5	3.75	3	1.5	.75
60 RPM	Chart Speed in./hr.	7-1/2	15	30	60	90	180	300	360	450	900	1800
Motor	Min. Event Time Sec.	24	12	6	3	2	1	.6	.5	.3	.2	.1

continued:
event recorders
and accessories

rustrak

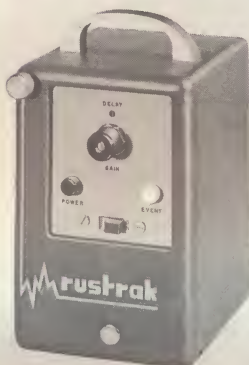
model 921 power unit



24 volt, DC at 400 MA to supply actuators; from 120 volt, 50/60 cycle power source.

model 921a Same as Model 921 for 240 volt, 50/60 cycles.

model 920 switching amplifier



The Model 920 Switching Amplifier is a transistor amplifier designed to operate one actuator of the Model 92 Event Recorder. This amplifier, when used with low millivolt AC signals, supplies the actuator power. Incorporated are continuously variable gain and time delay controls. Devices such as microphones or other low magnitude signals will operate the Event Recorder actuator.

model 922

photo electric switching amplifier

The Model 922 Photo Electric Switching Amplifier is a high gain D.C. transistor amplifier complete with a photo electric cell and light source. It supplies actuator power to a Model 92 Event Recorder by interruption of the light source. Because of the extremely high gain of this amplifier, it will operate at extremely low light intensity or with small changes of illumination.

model 133 single channel recorder (thermistor probe)

The Rustrak Model 133 is a self-contained temperature recording instrument which produces a high resolution, accurate recording of temperatures which the customer may select to meet his own needs. The instrument is available for single, dual channel, and differential temperature recordings.

All Model 133 recorders have a self-checking feature. Disconnecting the probe produces a full scale reading indicating correct calibration.



Primary Power	105-125V 60 cycle 210-250V 50 cycle (synchronous motor)
Temperature Span	25°F minimum, 100°F maximum
Temperature Range	0°F to 212°F
Accuracy	2% of span
Stability	1/2% of span

temperature
recorders

continued:
temperature
recorders

rusttrak

model 133a single channel differential recorder

model 133b dual channel recorder

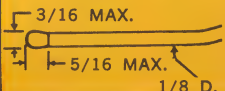
model 133c dual channel recorder

(one channel actual temperature, other channel differential)

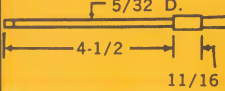
probes for model 133 temperature recorder

Four standard probes are available for use with Model 133 Temperature Recorders. All probes are directly interchangeable without recalibration of the recorder regardless of the probe type. The probes are equipped with ten foot cables. Extension cables up to 100 ft. are available.

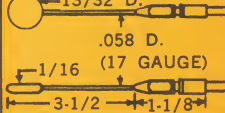
model 1331

	APPLICATION AND MATERIAL	PROBE LEAD AND CONNECTOR	TIME CONST.
 <p>INTERNAL (ORAL-RECTAL)</p>	Body temperature in humans and larger lab animals. Waterproof. Used with longer leads for deep water temperatures. Often buried for subsoil temperatures. Vinyl plastic tip.	10 foot vinyl covered shielded wire with phone plug	7 sec.

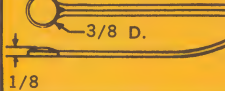
model 1332

	APPLICATION AND MATERIAL	PROBE LEAD AND CONNECTOR	TIME CONST.
 <p>UTILITY TUBULAR</p>	For liquid immersion applications requiring fast response. Excellent oral or rectal probe. Immersible only to cap unless specially waterproof. Stainless steel.	10 foot vinyl covered shielded wire with phone plug	3.7 sec.

model 1333

	APPLICATION AND MATERIAL	PROBE LEAD AND CONNECTOR	TIME CONST.
 <p>SURFACE TEMPERATURE (EXTENDED DISC)</p>	Skin temperatures, flat surface temperatures, oral temperatures. Auxiliary temperatures, soil surface temperatures, pipe temperatures. Surface measurement where handle is required. Stainless steel.	10 foot vinyl covered shielded wire with phone plug	0.8 sec.

model 1334

	APPLICATION AND MATERIAL	PROBE LEAD AND CONNECTOR	TIME CONST.
 <p>SURFACE TEMPERATURE (FLEXIBLE LEAD)</p>	Skin temperatures, flat surface temperatures, easy to tape in place. Pipe temperatures for heat loss or compression efficiency studies. Plastic backed. Stainless steel disc.	10 foot vinyl parallel conductor with phone plug	1.7 sec.

continued:
temperature
recorders

Model 133
Temperature Range.
High 212°F.
Low 0°F.

rust-rak

how to order model 133 temperature recorders and probes

To order your recorder, specify your SPAN in either Fahrenheit or Centigrade. Also specify your HIGH TEMPERATURE AND LOW TEMPERATURE. For example, if you want a recorder with a span between 30°F and 80°F in a SINGLE CHANNEL RECORDER — order as follows:

SINGLE CHANNEL RECORDER

SPAN	50°F	SPECIFY DESIRED PROBE/PROBES
HIGH TEMP	80°F	(Differential Recorders use two probes
LOW TEMP	30°F	each channel)

For differential temperature recorders the approximate temperature of the reference probe must be specified as well as the direction in which the other probe varies from the reference; i.e.: above, below, or both ways.

AVAILABLE TEMPERATURE SPANS FOR SINGLE CHANNEL RECORDER

SPAN	15°	20°	25°	30°	40°	50°	65°	75°	80°	100°
Fahrenheit			x	x	x	x	x	x	x	x
Centigrade	x	x	x	x	x	x				
Chart Paper Style	B	G	A	B	H	A	C	B	H	A

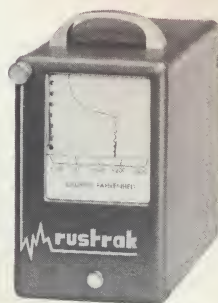
AVAILABLE TEMPERATURE SPANS FOR DUAL CHANNEL RECORDER

SPAN	15°	20°	30°	40°	45°	60°	75°	80°	90°	100°
Fahrenheit			x	x	x	x	x	x	x	x
Centigrade	x	x	x	x	x					
Chart Paper Style	F	D	F	D	F	D	F	D	F	D

model 144 single channel temperature recorder

The Rustrak Model 144 is a self-contained temperature recording instrument which produces a high resolution accurate recording of temperatures in the range of —100°F to +600°F. The sensing device consists of fine nickel wire. Unlike thermocouples, no reference point is required. Thirty-three standard spans are available in the above range meeting most temperature requirements within the scope of this instrument.

All Model 144 Recorders have a self-checking feature. Disconnecting the probe produces a full scale reading which indicates correct calibration.



Primary Power	105–125V 60 cycle 210–250V 50 cycle (synchronous motor)
Temperature Span	100°F minimum, 600°F maximum
Temperature Range	—100°F to +600°F
Accuracy	2.5% of span; 1/2% of highest temperature
Stability	1/2% of span

model 144a single channel differential recorder

probes for model 144 temperature recorder

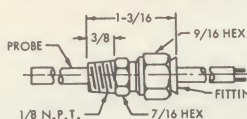
All Model 144 Recorders are supplied with a Model 1442 probe and a 15 ft. extension cable as standard equipment. All Model 1441 and 1442 probes are interchangeable without recalibration or readjustment of the instrument when used with the standard extension cable.

model 1441



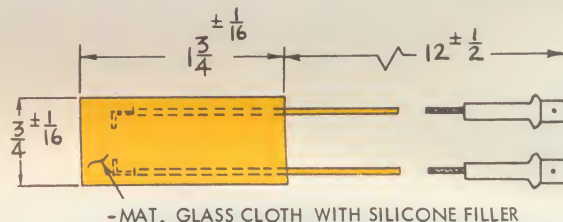
Utility probe made of 304 stainless steel capable of withstanding most corrosive fluids. Will withstand a pressure of 150 p.s.i. Continuous operating temperature is -100°F to $+600^{\circ}\text{F}$.

fitting 1443



Stainless steel high pressure fitting for inserting Model 1441 probe to a pressure vessel.

model 1442



A flexible surface probe with a grid embedded in a fiberglass and silicon rubber carrier. The time constant is $1/2$ sec. and the continuous operating temperature is -100°F to $+500^{\circ}\text{F}$.

standard temperature spans available

100°F Span Use Type A Chart Paper

-100 to 0
 -50 to $+50$
 0 to $+100$
 $+50$ to $+150$
 $+100$ to $+200$
 $+150$ to $+250$
 $+200$ to $+300$
 $+250$ to $+350$
 $+300$ to $+400$
 $+350$ to $+450$
 $+400$ to $+500$
 $+450$ to $+550$
 $+500$ to $+600$

200°F Span Use Type G Chart Paper

-100 to $+100$
 0 to $+200$
 $+100$ to $+300$
 $+200$ to $+400$
 $+300$ to $+500$
 $+400$ to $+600$

300°F Span Use Type K Chart Paper

-100 to $+200$
 0 to $+300$
 $+100$ to $+400$
 $+200$ to $+500$
 $+300$ to $+600$

400°F Span Use Type G Chart Paper

-100 to $+300$
 0 to $+400$
 $+100$ to $+500$
 $+200$ to $+600$

500°F Span Use Type A Chart Paper

-100 to $+400$
 0 to $+500$
 $+100$ to $+600$

600°F Span Use Type K Chart Paper

-100 to $+500$
 0 to $+600$

Centigrade ranges subject to chart paper limitations in above spans are available on order. Many odd spans also available on order.

recorder amplifier

SPECIFICATIONS

- absolute accuracy and stability: 1% of span
- input resistance: 100,000 ohms
- full scale sensitivity: 2 millivolts (1.5 millivolt typical)
- offset control: +350% to -1000%. Offset not affected by gain control setting
- gain control: from 2 millivolts to 200 millivolts
- cold junction compensation: selectable. Maximum error .04° per degree ambient change for 0 to +150°F. Iron-constantan, chromel-alumel or copper-constantan
- other thermocouple compensations available on order

controller recorder

The control elements consist of a double make or double break contact assembly which operates in the following manner. The recorder stylus makes contact between the writing bar (clammer bar) and a conductive disc. Contact is made every time the recorder clamps. The stylus travel thereby is not limited by the point of contact. There are four types of control evolved from two basic types. The two basic types consist of Style A and Style B.

model 147 amplified recording system



The Model 147 amplified recording system consists of a stable, chopper-stabilized DC amplifier, a selectable automatic temperature compensator, and a matching recorder. It is suitable for either laboratory or industrial measurements of temperature with thermocouples, or for DC voltages to low millivolt levels for use with strain gages or temperature bridges, where extremely narrow spans are desired.

Maximum full scale sensitivity is better than 2 millivolts. A multi-turn attenuator is included to allow accurate full scale sensitivity from 2 millivolts to several volts. Also included is a multi-turn zero offset control producing up to ten times full scale deflection. The injected offset is independent of the gain setting. The input resistance is 100,000 ohms.

Selectable automatic cold junction compensation is included for either Iron-Constantan or Chromel-Alumel thermocouples. The automatic cold junction compensation reduces the error caused by ambient variation between zero and 150°, allowing the Model 147 to be used in uncontrolled environments. The selector switch also allows the automatic compensation to be disconnected so that the system can be used as a high impedance DC amplifier.

The recorder scale is calibrated from zero to 10 and uses a chart paper with 50 divisions. As a temperature recorder, it can be set up for reading and recording temperature spans as low as 50° over a range of -300°F to 2500°F. With the use of a millivolt source, the Model 147 can be set up for specific temperature jobs and changed at will or as required, so that this versatile instrument can generally replace a number of instruments. Because of the high input resistance of the system, the thermocouple resistance or length can be disregarded.

The Model 147 can be equipped with the Model 141 Controller to produce automatic controls of parameters within the scope of this instrument.

Model 147A Recorder is the same as the 147 except that it is calibrated with special scales to the customer's specifications.



model 141 controller



In Style A the left knob produces contact from extreme left to center of scale and the right knob produces contact from extreme right to center of scale. In this method, the contacts disappear into the ends of the scale and converge on the center depending on the position of the knobs.

In the B control, operation is similar to above except that the contacts are the mirror image of the above. In this case the contacts disappear into the center of the scale and fan out toward the ends depending on the relative position of the control knob.

In the C type control the left contact is identical to the left contact on the type A control and the right contact is identical to the right contact on type B control. This type should be used to produce contact from left of scale to the extreme right of scale passing the center.

The D type control represents the mirror image of C. The left contact is the same as the left contact of B and the right contact is the same as the right contact of A. This type of operation is identical to C except that operation is from right to left.

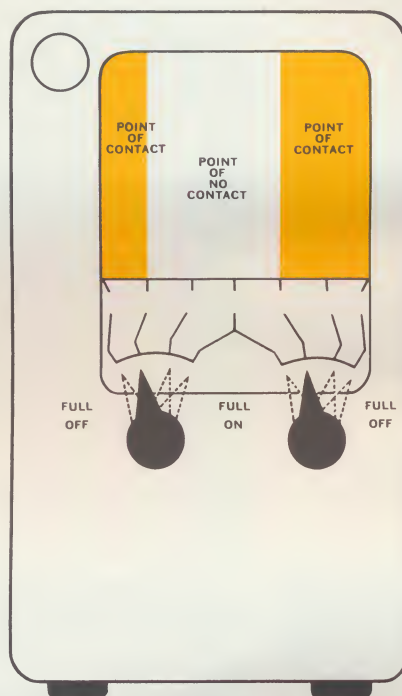
All of the above contacts are connected to the rear of the recorder through a control amplifier and a single pole double throw relay which will carry five amperes at 125 volts AC.

See next Page for Illustrations of Controls. A, B, C, D.

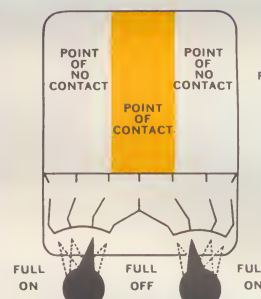
continued:
controller
recorder

rustrak

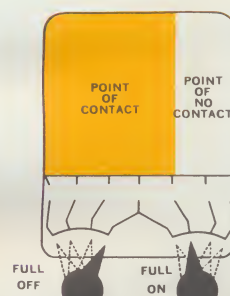
types of controls



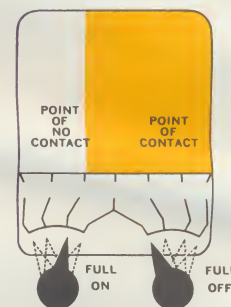
Style A



Style B



Style C



Style D

galvanometer
plus
event recorder

model 146



The Model 146 is a two channel recorder featuring a galvanometer channel and an event channel.

The galvanometer channel will record analog information on two inches of chart graduations allowing high resolution and accuracy. The event marker is located on the righthand edge of the chart paper.

Two types of galvanometers are available with this unit, ie: 1 MA or 100 μ a. With the above two galvanometers, many current and voltage combinations in either AC or DC are available on special order. The event marker can be ordered for 6, 12, 24 or 48 volts DC.

Typical applications for the Model 146 recorder would be for use where chart speeds are not constant, to record time study information, or for recording the on-off cycles of a compressor or oven. The Model 146 can be used to record any variable plus an event, one variable plus an event, or to record temperatures.

command print[®] recorder

model 109

Most Rustrak Recorders can be equipped with Rustrak's exclusive Command Print[®] feature as follows:

109A selective command print

This allows the recorder chart to operate continuously producing time information. The galvanometer stylus can swing freely. A signal (voltage) when applied to the Command Print solenoid produces a single dot on the chart paper indicating precise analog information and time.

109B automatic command print

As above the chart paper moves continuously. Upon signal to the Command Print solenoid, the recorder operates in normal fashion producing continuous analog information until signal (voltage) is removed from Command Print solenoid.

operating voltages for command print solenoid

24, 48, 115 volt DC, 115 volts AC and 240 volts AC.

two-point recorder feature

model 137

The Model 137 Two-Point Feature is available with most Rustrak Single Channel Recorders. It permits their use as time shared two channel recorders with full scale resolution, 2-5/16", on both channels. The operating principle is based on internal synchronous switching of the galvanometer terminals to dual independent inputs. Jumpering the input terminals restores standard single channel operation.

Each channel is individually identified, one as a continuous trace, the other with an identifying break every half inch regardless of chart speed.

Common scale or dual scales may be installed to allow the recording of two distinct parameters as required. This feature is limited to a maximum writing speed of one strike per channel each eight seconds obtained with a Rustrak one RPM motor.

The Two-Point Feature is mounted in the familiar Rustrak case 3 5/8" wide x 5 5/8" high, minimum depth being 5 5/8". Four terminal jacks for two inputs are brought out the rear.

Available recommended chart and writing speeds:

1/2 RPM motor — every 16 sec.

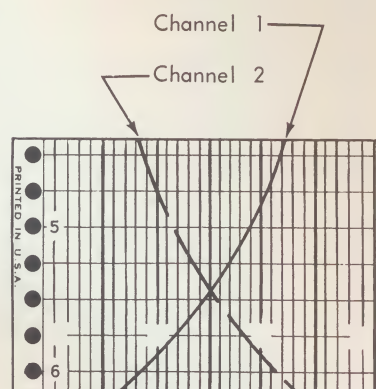
1 RPM motor — every 8 sec.

2 RPM motor — every 4 sec.*

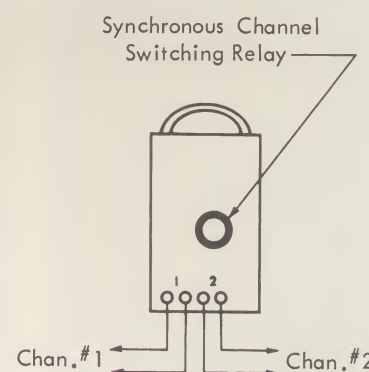
(See data on page 14.)

#12 gear train maximum.

*special applications only



SAMPLE CHART

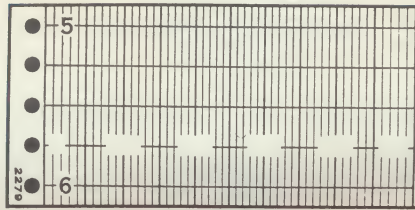


REAR VIEW

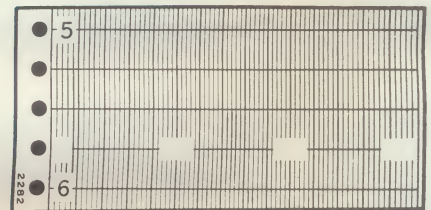
standard chart paper

Overlay printed paper available on order.
Contact us on particulars.

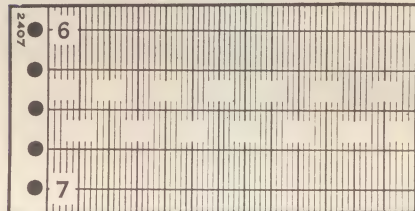
rusttrak



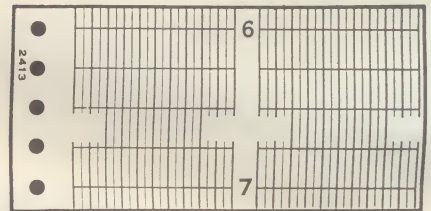
Style "A" 50 Divisions



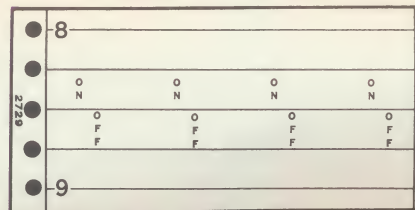
Style "B" 75 Divisions



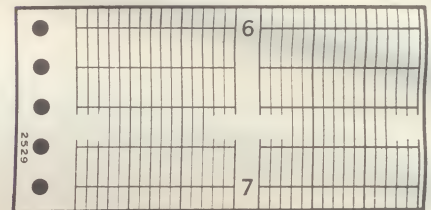
Style "C" 65 Divisions



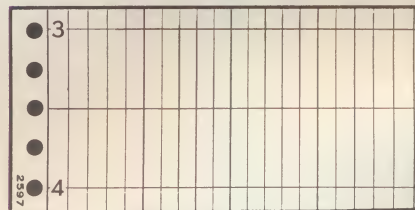
Style "D" 20 Divisions
(each channel)



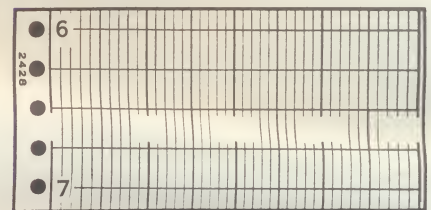
Style "E" 4 Events



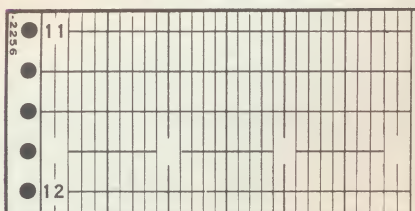
Style "F" 15 Divisions



Style "G" 20 Divisions



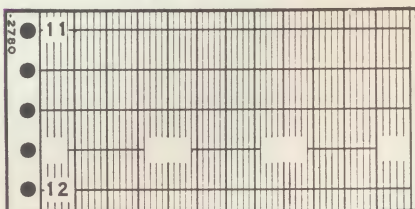
Style "H" 40 Divisions



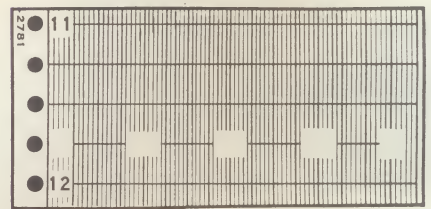
Style "I" 30 Divisions



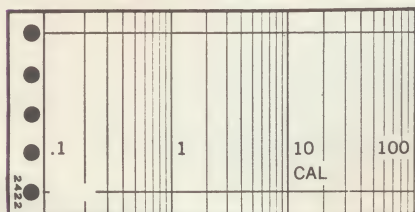
Style "J" 4 Decade Log



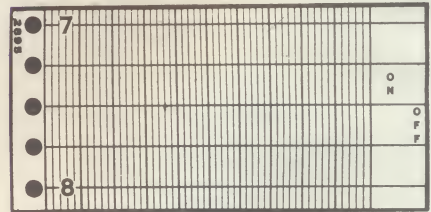
Style "K" 60 Divisions



Style "L" 80 Divisions



Style "M" 3 Cycle Log



Style "N" 50 divisions plus one event.

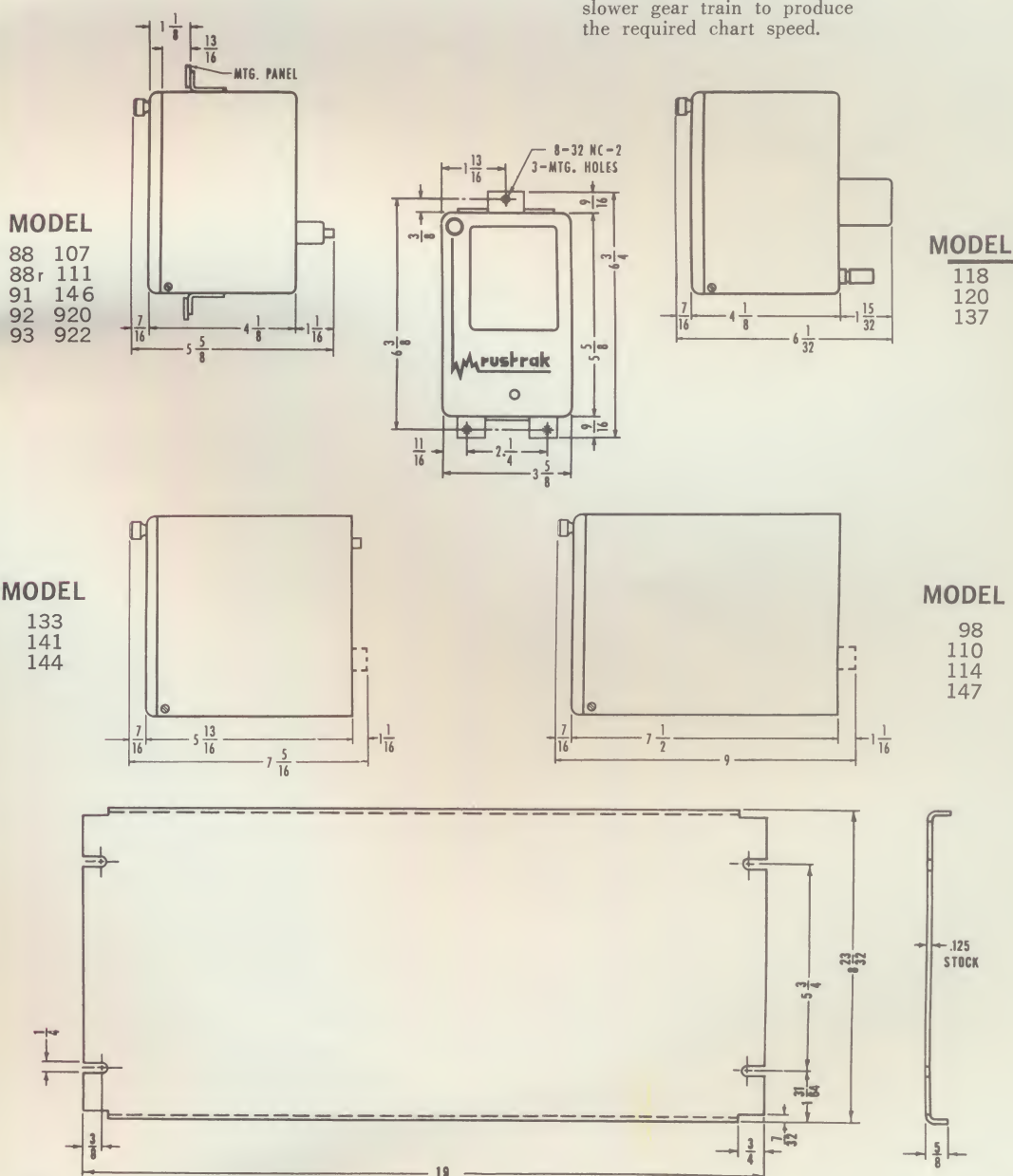
The chart in the yellow panel to the right is for all Rustrak recorders. For additional speeds and event times for Model 92, refer to page 5.

rack mounting panels

rust-rak

Drive Motor RPM	GEAR BOX NUMBER											Writing Speed (strikes) Per Second	
	1/4	1/2	1	2	3	6	10	12	15	30 *	60 *		
CHART SPEED IN INCHES PER HOUR													
										*	*		
1/2	1/16	1/8	1/4	1/2	3/4	1-1/2	2-1/2	3		3-3/4	7-1/2	15	1 every 8 sec
1	1/8	1/4	1/2	1	1-1/2	3	5	6		7-1/2	15	30	1 every 4 sec
2	1/4	1/2	1	2	3	6	10	12		15	30	60	1 every 2 sec
4	1/2	1	2	4	6	12	20	24		30	60	120	1
6	3/4	1-1/2	3	6	9	18	30	36		45	90	180	1-1/2
8	1	2	4	8	12	24	40	48		60	120	240	2
10	1-1/4	2-1/2	5	10	15	30	50	60		75	150	300	2-1/2
12	1-1/2	3	6	12	18	36	60	72		90	180	360	3
15	1-7/8	3-3/4	7-1/2	15	22-1/2	45	75	90		112-1/2	225	450	3-3/4

*These gear trains and chart speed combinations produce a light recorded trace because the individual dots are separated by fast moving chart paper. For darker traces, select a faster drive motor with a slower gear train to produce the required chart speed.



PANELS AVAILABLE FOR 2, 3, OR 4 RECORDERS

drive motors

motor type 120 volt/60 cycle

1/2 rpm	8 rpm
1 rpm	10 rpm
2 rpm STANDARD	12 rpm
4 rpm	15 rpm
6 rpm	

120 volt or 240 volt/50 cycle

1 rpm
2 rpm
6, 8, 10, 12, 15 rpm

unregulated DC motors

All speeds indicated

6 volt, 18 milliamperes $\pm 10\%$
12 volt, 16 milliamperes $\pm 10\%$
24-28 volt, 8 milliamperes $\pm 10\%$
48 volt, 7 milliamperes $\pm 10\%$

regulated DC motors

6 volt, 73 milliamperes
12 volt, 28 milliamperes
24 volt, 20 milliamperes
Speeds and voltages as above

400 cycle motors

115 volt/380 to 420 cycles.
Speeds available on request.

NOTE: Speed regulation for unregulated DC motors $\pm 5\%$ at applied voltage only. Regulated DC motors guaranteed better than 0.1% at $\pm 20\%$ of applied rated voltage.

NOTE: All drive motors indicated above have a guaranteed operating life of 10,000 hours.

The Rustrak Recorders illustrated and described in this catalog do not constitute the complete Rustrak line. Through its representatives, Rustrak offers a complete service for Original Equipment Manufacturers who wish to utilize our recorders as part of their systems. The Rustrak Recorder, in addition to its ability to record and control, can have other functions integrated into the recorders such as timing, switching, wave form generation, etc.

If you have any specific problems with regard to recording or automatic data gathering or control for either civilian or military applications, a Rustrak factory engineer or representative will be pleased to assist you.

Automatic charting of data, which heretofore was not practical because of adverse environmental conditions, is now entirely feasible due to the proven ruggedness and performance of Rustrak Recorders. Rustrak has pioneered in producing low-cost precision instruments and will continue to be first in bringing you many new low-cost precision data gathering instruments and systems.

rustrak



**INSTRUMENT
COMPANY, INC.**

A SUBSIDIARY OF **Gi** GULTON INDUSTRIES, INC.

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